## Journal Features Climate Modeling Articles by CRD's Chris Ding, Helen He

The International Journal of High Performance Computing Applications (IJHPCA) has dedicated its Fall 2005 issue to climate modeling, especially on the software design of the Community Climate System Model (CCSM). Among the contributing authors are CRD's Helen He and Chris Ding, who wrote an article on "Coupling Multicomponent Models with MPH on Distributed Memory Computer Architectures" and contributed to another on "CPL6: The New Extensible, High Performance Parallel Coupler for the Community Climate System Model." The special issue of the journal can be found at <http://hpc.sagepub.com/content/ vol19/issue3/>.
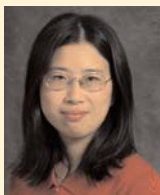
Helen He
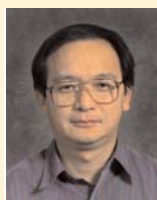
Many of the authors are currently collaborating on a SciDAC climate project about Collaborative Design and Development of CCSM. This is a multi-institutional effort involving the National Center for Atmospheric Research, NASA and Argonne, Berkeley, Los Alamos, Lawrence Livermore, Oak Ridge and Pacific Northwest national labs. The goal of the project is to provide U.S. researchers with state-of-the-art coupled climate simulation capabilities. CCSM modeling results are part of the U.S.' submission to the Intergovernmental Panel on Climate Change Fourth Assesment Report (IPCC AR4).

Chris Ding

CRD Report

CRD Report is published every other month, highlighting recent achievements by staff members in Berkeley Lab's Computational Research Division. Distributed via email and posted on the Web at http://crd.lbl.gov/DOEresources, CRD Report may be freely distributed. CRD Report is edited by Jon Bashor, JBashor@lbl.gov or 510-486-5849.

Berkeley Lab's John Bell Receives 2005 Sidney Fernbach Award

John Bell, a senior staff mathematician at the U.S. Depart-ment of Energy's Lawrence Berkeley National Laboratory, has been named as the recipient of the 2005 Sidney Fernbach Award. The Fernbach Award is given by the IEEE Computer Society for an outstanding contribution in the application of high performance computers using innovative approaches. The award was presented at the SC05 conference held Nov. 12-18, 2005, in Seattle.

John Bell

"I am delighted to confirm that you have been selected to receive the 2005 Sidney Fernbach Award with the following citation: For outstanding contributions to the development of numerical algorithms, mathematical and computational tools and on the application of those methods to conduct leading-edge scientific investigations in combustion, fluid dynamics and condensed matter," IEEE Computer Society President Gerald Engel wrote to Bell.

Bell, who joins LBNL's Phil Colella and David Bailey as recipients of the Fernbach Award, leads the Center for Computational Sciences and Engineering in LBNL's Computational Research Division.

The citation on Bell's award read, "John is at the top-most tier of the computational science community. His sustained record of outstanding technical contributions broadly used and accepted techniques and top quality mathematical software packages clearly qualify him for the Fernbach Award."

The most recent work of Bell and his group, featured on the July 19, 2005 cover of the Proceedings of the National Academy of Sciences, was the development of the most impressive direct numerical simulation (DNS)-style combustion simulations to date. These laboratory-scale

CRD's Barenblatt Wins Timoshenko Medal for Applied Mechanics

In November, the American Society of Mechanical Engineers presented Grigory Isaakovich Barenblatt of CRD's Mathematics Group with the Timoshenko Medal "for seminal contributions to nearly every area of solid and fluid mechanics, including fracture mechanics, turbulence, stratified flows, flames, flow in porous media, and the theory and application of intermediate asymptotics."

Grigory Barenblatt

The Timoshenko Medal was established in 1957 and is conferred in recognition of distinguished contributions to the field of applied mechanics. Instituted by the Applied Mechanics Division, it honors Stephen P. Timoshenko, world-renowned authority in the field, and it commemorates his contributions as author and teacher.

Barenblatt, a frequent collaborator with Alexandre Chorin of the Math Group, has authored a number of articles examining the effects of turbulence in areas ranging from aircraft design to the formation of hurricanes.

In 1999, Barenblatt was named the first recipient of a new international prize in applied mathematics, the Maxwell Prize, established by the International Congress on Industrial and Applied Mathematics (ICIAM).

His contributions to mathematics have also led to his election as a foreign member of the Royal Society of London, the independent scientific academy of the United Kingdom; the United States' National Academy of Engineering; the National Academy of Sciences; and the American Academy of Arts and Sciences.

CRD's Brian Tierney Writes Article on Maximizing Network Throughput

Brian Tierney, a member of CRD's Distributed Systems Department, has built a strong track record in analyzing the performance of networks and distributed computing systems. His Netlogger toolkit allows users of distributed systems to analyze performance and locate bottlenecks which hamper the overall performance of a system. He recently shared his expertise in an article he wrote for OnLAMP.com. LAMP, an acronym used in Germany to define how MySQL is used in conjunction with Linux, Apache and either Perl, Python or PHP, led to the creation of OnLAMP.com, the open source Web platform.

Brian Tierney

Here's the intro to Brian's article:
"The other day my friend Bob came to me with a question. He'd written a Java program to copy 100 MB data files from his Windows XP computer at his office in Sunnyvale to a Linux server at his company's East Coast office in Reston, Va. He knew both offices had 100 Mbps Ethernet networks that connected over a 155 Mbps Virtual Private Network (VPN). When he measured the speed of the transfers, he found out that his files were transferring at less than 4 Mbps, and wondered if I had any idea why.

"I wrote this article to explain why this is the case, and what Bob needs to do to achieve the maximum network throughput. This article is aimed mainly at software developers. All too often software developers blame the network for poor performance, when in fact the problem is untuned software. However, there are times when the network is the problem. This article also explains some network troubleshooting tools that can give software developers the evidence needed to make network engineers take them seriously."

Read the full story at <http://www.onlamp.com/pub/a/onlamp/2005/11/17/tcp_tuning.html?page=1>.

ACM Transactions Issue Devoted to DOE's ACTS Collection

The Association of Computing Machinery dedicated the September 2005 issue of Transactions on Mathematical Software (ACM TOMS) to the ACTS Collection. The DOE Advanced CompuTational Software (ACTS) Collection (http://acts.nersc.gov) comprises a set of tools mainly developed at the DOE laboratories. These software tools aim to simplify the solution of common and important computational problems and have substantially benefited a wide range of scientific and industrial applications.

Tony Drummond

Osni Marques

The ACTS Collection is maintained by Osni Marques and Tony Drummond of CRD's Scientific Computing Group. They also served as guest editors-in-chief for the special issue, as well as authors of two articles in the journal. Sherry Li of the Scientific Computing Group also contributed "An Overview of SuperLU: Algorithms, Implementation, and User Interface."

The ACM TOMS table of contents and links to the articles can be found at <http://www.acm.org/toms/Current.html#v31n3>.

Bell Receives 2005 Fernbach Award

simulations of turbulent premixed methane combustion used 20 chemical species, 84 reactions, and no models for turbulence or turbulence chemistry interactions. For the first time researchers have been able to compare full-field images of entire laboratory-scale turbulent flames with views of the same produced by computer simulations uncompromised by turbulence models. This work allows direct comparison with experiment and contains sufficient chemical fidelity to allow detailed investigation of how the turbulence affects the process of combustion itself.

In 2003, Bell was a co-recipient of the SIAM/ACM Prize in Computational Science and Engineering, awarded by the Society for Industrial and Applied Mathematics (SIAM) and the Association for Computing Machinery (ACM). His current research focuses on the development and analysis of numerical methods for partial differential equations arising in science and engineering. He has made contributions in the areas of finite difference methods, numerical methods for low mach number flows, adaptive mesh refinement,

interface tracking and parallel computing. He has also worked on the application of these numerical methods to problems from a broad range of fields, including combustion, shock physics, seismology, flow in porous media and astrophysics.

Prior to joining LBNL, Bell held research positions at Lawrence Livermore National Laboratory, Exxon Production Research and the Naval Surface Weapons Center.

In addition to his research contributions, Bell has also been an active contributor to the research community. He served as co-organizer of the 2004 SIAM Annual Meeting. He was editor of the SIAM Review from 1994-97 and editor of the Journal of Computational Physics from 1990-91. Most recently, he helped launch and serves as managing editor of the journal Communications in Applied Mathematics and Computational Science (CAMCoS).

Bell earned his B.S. from the Massachusetts Institute of Technology (1975) and his M.S. (1977) and Ph.D. (1979) from Cornell University, all in mathematics.